

What is claimed is:

Self
CA 1. A back brace apparatus comprising:
a brace body adapted to be wrapped around the trunk of a patient, said brace body comprising two ^{*separate*} segments;
means at the end of each brace segment for allowing the two ends to be detachably connected together around the patient's trunk; and,

B means for automatically tightening the brace comprising a cable operatively connected to said two segments, a motor operatively connected to apply tension to said cable, and means for controlling said motor.

2. The back brace apparatus as set forth in claim 1, wherein said brace segments are held together by said cable.

3. The back brace apparatus as set forth in claim 1, wherein said means for automatically tightening the brace further comprises a reduction gear train connected to said motor, a worm attached to said gear train, a worm gear engaged with said worm, a spool connected to said worm gear to which is attached one end of the cable with the other end of the cable affixed to the other brace segment so that operation of the motor shortens or lengthens the cable in order to tighten or loosen the brace.

3 4. The back brace apparatus as set forth in claim 1 wherein the cable is run through at least one pulley mounted on one of the brace segments.

Self
b2 5. The back brace apparatus as set forth in claim ^{*3*} 4 further comprising a set of pulleys mounted on each brace segment with the cable running through a pulley on each segment in alternation, shortening of the cable pulling the two brace segments together and tightening the brace with the aid of a mechanical advantage dependent upon the number of pulleys mounted on each brace segment.

46. The back brace apparatus as set forth in claim 1 further comprising means for storing data including time and associated brace tension settings and brace tension, and means for outputting said data for use by a health care professional.

03/ ~~7.~~ The back brace apparatus as set forth in claim 1 further comprising: a microprocessor for controlling the operation of the motor by controlling the number of revolutions made by the motor; means for inputting the number of revolutions made by the motor into the microprocessor; and wherein the microprocessor can store for later recall the number of revolutions made by the motor, the stored number thereby constituting a position setting for the brace.

8. The back brace apparatus as set forth in claim 1, further comprising means for automatically loosening the brace tension when the brace is taken off of a user comprising means to periodically sense the tension of the brace, means to store information of a last user input, means to compare tension of the brace with what it should be in accordance with the last user input, and means for spreading the brace segments when the tension sensed is substantially less than what it should be in accordance with the last user input.

9. The back brace apparatus as set forth in claim 8, wherein said means for periodically sensing the tension of the brace comprises means for momentarily turning the motor on and determining load.

5/ ~~10.~~ The back brace apparatus as set forth in claim 1, wherein said means for allowing the two ends of the brace segments to be detachably connected together comprises a section of hook-and-loop fastener material on each of the ends.

~~10~~ ~~11.~~ The back brace apparatus as set forth in claim 1, further comprising means for determining whether user has removed said brace

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Q without loosening the tension setting and *for* operating said means for controlling said motor to *for* loosen said cable, and means for ~~unloosening the tension setting~~ and unspooling the cable.

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Q ¹¹12. The back brace apparatus as set forth in claim ¹⁰11, wherein said means for determining whether user has removed said brace without loosening the tension setting and *for* operating said means for controlling said motor to loosen said cable comprises means for periodically sensing the tension of the brace by momentarily turning the motor and checking the motor current consumption, means for comparing motor current consumption with what it should be in accordance with the last *user input* ~~key pressed~~, and means for operating said motor to unspool said cable when said motor current consumption is substantially less than what it should be in accordance with the last *input* ~~key pressed~~.

Q ¹²13. The back brace apparatus as set forth in claim ¹⁰11, wherein said means for ~~unloosening the tension setting~~ and unspooling the cable comprises spring means for spreading said brace segments apart upon loosening of said cable.

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¹³14. The back brace apparatus as set forth in claim ¹⁰11, wherein said means for determining whether user has removed said brace without loosening the tension setting and *for* operating said means for controlling said motor to loosen said cable comprises means for periodically sensing the tension of the brace, means to store information of a last user input, means to compare tension of the brace with what it should be in accordance with the last user input, and means for operating said motor to unspool said cable when the tension sensed is substantially less than what it should be in accordance with the last user input.

a ¹⁴15. The back brace apparatus as set forth in claim ¹³14, wherein said means for periodically sensing the tension of the brace comprises means for momentarily turning the motor on and determining

load.

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16. The back brace apparatus as set forth in claim 14, wherein said means for ~~un~~loosening the tension setting and unspooling the cable comprises spring means for spreading said brace segments apart upon loosening of said cable.